Customizing Cancer Care

This year marks the 10th anniversary of the completion of the draft sequence of the human genome. At the White House event celebrating this landmark achievement in biomedical research, President Bill Clinton remarked, "With this profound new knowledge, humankind is on the verge of gaining immense, new power to heal. Genome science will have a real impact on all our lives—and even more, on the lives of our children. It will revolutionize the diagnosis, prevention, and treatment of most, if not all, human disease."

Ten years later, the impact of genome sciences is yet to be widely felt in mainstream healthcare, but it is readily apparent at the forefront of clinical research, particularly in the realm of cancer. At CCR, several investigators are using genomic and genetic information on an unprecedented scale to understand and treat different forms of cancer.

As we learn in "Pediatric Tumors Made Personal," Javed Khan, M.D., is launching a multicenter trial for pediatric solid tumors in which clinical researchers will guide the treatment of individual patients with relapsing cancers using information obtained from the comprehensive analysis of their particular cancer genomes.

Meanwhile, in another wing of the Clinical Center at NIH, Ola Landgren, M.D., Ph.D., is running the first natural history study of precursor diseases that lead to multiple myeloma. As he describes in "Multiple Approaches to Myeloma," Landgren and his colleagues are studying the genetic and molecular signatures that define progression from precursor to full-blown disease with the ultimate aim of stopping multiple myeloma before it starts.

Diagnostic and prognostic power is also a goal for Tom Misteli, Ph.D., and his Research Fellow, Karen Meaburn, Ph.D., who have recently reported that the spatial position of genes in the nucleus may reflect their cancerous state. Their work is described in the article, "Everything in Its Right Place," and we also hear directly from Dr. Meaburn in our "In Conversation" series about her hopes for turning this observation into a prognostic tool for breast cancer.

(Photo: B. Branson)

Robert Wiltrout, Ph.D.

Of course, knowing what has changed in a particular cancer may not only be a tool for diagnosis but also a target for treatment. Natasha Caplen, Ph.D., is working with a number of investigators to use the power of functional genomics to look for new targets and analyze molecular interactions of existing drugs. In "The Art of Silence," we are treated to a sampling of the studies that are under way in her laboratory using RNA interference to systematically disrupt individual genes in order to study their function and response to therapy.

Depending on your perspective, ten years can seem an eternity or the blink of an eye. For clinicians and patients, cures can never come quickly enough. But as biomedical researchers, we can also view our progress with amazement. Ten years after the genomic revolution was formally declared, we are actively translating the most basic biological information contained in our DNA into tools for the diagnosis and personalized treatment of cancer.